

IN THE CLAIMS:

Claims 1-40 (canceled).

Claim 41 (original): A piezo oscillator characterized in that:

the piezo oscillator contains a piezo resonator, oscillating transistor, and two quick start-up circuits;

a first quick start-up circuit applies a start-up quickening voltage to the piezo resonator only for a predetermined length of time after the application of the power supply voltage Vcc; and

a second quick start-up circuit increases the collector current of the oscillating transistor only for a predetermined length of time after the application of the power supply voltage Vcc.

Claim 42 (currently amended): A piezo oscillator characterized in that:

the piezo oscillator contains a piezo resonator, oscillating transistor quickening voltage ~~star~~, and two quick start-up circuits;

the quick start-up circuits each have one or more switch circuits;

a first quick start-up circuit applies the power supply voltage Vcc to the piezo resonator as a start-up quickening voltage through the switch circuit only for a predetermined length of time after the application of the power supply voltage Vcc; and

a second quick start-up circuit bypasses an emitter resistor, a collector resistor, or both of the oscillating transistor through the switch circuit or switch circuits to increase the collector current of the oscillating transistor only for a predetermined length of time after the application of the power supply voltage Vcc.

Claims 43-45 (canceled).

Claim 46 (original): A piezo oscillator comprising a quick start-up circuit and an oscillation circuit that contains a piezo resonator and an amplifying circuit, wherein

said quick start-up circuit is comprised of:

a bypass transistor switch that bypasses predetermined circuit portions of said oscillation circuit,

a control transistor switch that makes ON/OFF controls of said bypass transistor switch, and

a capacitor connected to a base of said control transistor switch; and

said quick start-up circuit functions so that for a predetermined length of time between application of power supply voltage V_{cc} and completion of charging of electrical charge to said capacitor, a charge current according to said charging of said electrical charge is supplied to said control transistor switch, thus activating ON operation of said control transistor switch and bypass transistor switch; and

changes in operation conditions of said oscillation circuit by said ON operation temporally increase electric current that flows in said piezo resonator to forcibly vibrate said piezo resonator, thus making start-up of said piezo oscillator faster.

Claim 47 (canceled).

Claim 48 (currently amended): The piezo oscillator according to claim 46, wherein said quick start-up circuit is comprised of a first NPN transistor, which is said bypass transistor, and a second NPN transistor which, is said control transistor, and is structured so that:

said first NPN transistor is connected, in forward polarity, between said power supply voltage V_{cc} line and one terminal of said piezo resonator,

a resistor is inserted and connected between a base and an emitter of said first NPN transistor,

said second NPN transistor is connected, in forward polarity, between said power supply voltage V_{cc} line and a base of said first NPN transistor, and

said capacitor is inserted and connected between said power supply voltage V_{cc} line and a base of said second NPN transistor; and wherein

a start-up quickening voltage is applied, for a predetermined length of time after application of said power supply voltage V_{cc} , to said piezo resonator from said power supply voltage V_{cc} line via said first NPN transistor, thus temporarily increasing electric current that flows in said piezo resonator so as to forcibly vibrate said piezo resonator, and making start-up of said piezo oscillator faster.

Claim 49 (currently amended): The piezo oscillator according to claim 46, wherein according to rise of voltage of said power supply voltage V_{cc} and for a predetermined length of time after application of said power supply voltage V_{cc} , said quick start-up circuit outputs start-up quickening voltage that has steeper rise characteristics than the rise characteristics of said power supply voltage V_{cc} [,].

Claim 50 (currently amended): The piezo oscillator according to claim [[45]] 46, wherein

said amplifying circuit contains an oscillating transistor, a second quick start-up circuit, and a collector resistor for said oscillating transistor, and

said collector resistor is inserted and connected between a collector and an emitter of [[said]] a second bypass transistor switch in said second quick start-up circuit,

wherein in said second quick start-up circuit comprises:

a base of [[said]] a second control transistor switch and said power supply voltage Vcc line are connected via [[said]] a second capacitor, and

a collector of said second control transistor switch and a base of said second bypass transistor switch are connected; and wherein

with a control of an ON/OFF operation of said second control transistor switch according to a charge current of said second capacitor, terminals of collector resistor of said oscillating transistor are connected by said second bypass transistor switch for a predetermined length of time after application of power supply voltage Vcc so as to increase collector current of said oscillating transistor, thus temporarily increasing electric current that flows in said piezo resonator so as to forcibly vibrate said piezo resonator and to shorten start-up time of said piezo oscillator; and after said predetermined length of time, a control by said second quick start-up circuit is stopped and collector current of said oscillating transistor switch is lowered to a desired level.

Claim 51 (currently amended): The piezo oscillator according to claim 46, wherein

said amplifying circuit contains an oscillating transistor and said quick start-up circuit and a second quick start-up circuit;

said quick start-up circuit applies, for a predetermined length of time after application of power supply voltage Vcc, power source voltage Vcc to said piezo resonator as an oscillation quickening voltage via [[said]] a bypass transistor switch provided in said quick start-up circuit; and

said second quick start-up circuit, for a predetermined length of time after application of said power supply voltage Vcc, increases collector current by bypassing a collector resistor or a emitter resistor or collector and emitter resistors with [[said]] a bypass transistor switch provided in said second quick start-up circuit.

Claim 52 (original): A piezo oscillator comprising a quick start-up circuit and an oscillation circuit that contains a piezo resonator and an amplifying circuit,

said quick start-up circuit is comprised of:

a single NPN transistor having functions of a bypass transistor switch in forward polarity between a power supply voltage Vcc line and one terminal of said piezo resonator, and

a capacitor connected to a base of said single NPN transistor,

and said single NPN transistor bypasses predetermined circuit portions of said oscillation circuit, said capacitor provided said power supply voltage Vcc line and a base of NPN transistor, and wherein

a start-up quickening voltage is applied, for said predetermined length of time, to said piezo resonator from said power supply voltage Vcc line via said NPN transistor, thus temporarily increasing electric current that flows in said piezo resonator to forcibly vibrate said piezo resonator, and making start-up of said piezo faster.